THE IMPACT OF BUSINESS SERVICE IN INFORMATION AND COMMUNICATION TECHNOLOGIES INDUSTRY ON ECONOMIC GROWTH OF INDONESIA: AN ANALYSIS USING VALUE-ADDED MULTIPLIER APPROACH

By

WARDJITO, Frevita Maheswari

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ABSTRACT

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By

Frevita Maheswari

The main purpose of this study is to perform in-depth analysis associated with the role of business services in ICT industry in Indonesia. In addition, it is also important to conduct further research by filling the gap from the previous study (Zuhdi 2014b), such as conduct inter-country comparison between Indonesia and developed countries as compared countries, i.e. Korea, the United States, France, the United Kingdom, Denmark and the Netherlands. For this purpose, the researcher will adopt a quantitative methodology by using the input-output table in each country over the time period examined (1995, 2000, 2005 and 2011). In addition, the value-added multiplier approach will also be used to estimate the economic impact and also to identify its correlation with share of business service in the ICT industry in each sample country.

The findings indicate that the contribution of ICT services to Indonesia economy has increased during 2000-2011. The increase in the value of VAM in ICT products mainly was driven by the increase in the share of total value-added and total intermediate input on average of the ICT industry in Indonesia. Moreover, ICT services (post and telecommunications and computer and related activities) are the larger contributor to the value of VAM in ICT products than manufactured ICT goods. This study also indicates the level of labor productivity in ICT industry has recorded a remarkable increase during 2005-2011. It illustrates that the gap in labor productivity between Indonesia and other sample countries become smaller over time.

Keywords: ICT; Input-Output analysis; Value-Added Multiplier; business service

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INTRODUCTION

1.1. Background

Information and Communication Technologies (ICT) play an imperative role in today's innovation activities. All scientific, technological, organizational, financial and commercial steps which direct to the performance of innovations are considered as innovation activities (OECD 2005). Moreover, Research and Development (R&D) that is indirectly related to the development of a certain innovation is also included in innovation activities (OECD 2005).

Figure 1 (Appendix A) shows the expansion of ICT sector and its sub-sectors in terms of value-added in the Organization for Economic Co-operation and Development (OECD) countries in 2008-2015 by using USD current prices (USD 100) and 2008 as the base year (OECD 2017). In this figure, the ICT industry is determined as the total of sectors: computer, electronic and optical products (ICT manufacturing), software publishing, Telecommunications and Information Technology (IT) and other information services (ISIC Rev.4). As from the global economic crisis in 2008, total value-added and value-added in the ICT industry has remained steady. However, value-added of IT and information services have increased significantly, while value-added of ICT manufacturing has slightly decreased (OECD 2017). It means that the contribution of ICT service is higher than ICT manufactured product in terms of value-added.

Meanwhile, the growth trend of business services in OECD countries seems contradictory to Indonesia. According to the Services Trade Restrictiveness Index (STRI), services sectors account for about 10% of Indonesia's exports and about 15% of its imports. The service share in value-added terms is significantly higher for imports at 45% compared to exports at 28%. This

means that Indonesia imports service-intensive goods. Services also contribute to a higher share of employment than GDP at 46%, indicating that labor productivity is lower in services than in other sectors. Telecommunications, legal services, and distribution services are the three sectors with the highest score relative to the average in Indonesia (OECD 2017). It illustrates that business service sectors in Indonesia still focus on imports activity, which could affect the labor productivity and economic development.

Accordingly, to support the development of e-commerce in Indonesia, the government announced the Presidential Regulation No. 74/2017 on Roadmap E-Commerce for 2017-2019. This guideline was determined based on a consideration that e-commerce has a high economic potential for Indonesia since it has the most widespread internet users. Big data and advanced analytics use increased by 60 percent in 2014-2015. In addition, the number of mobile internet users increased by more than 20 percent (13 million) during 2015-2017 (Kinda and Yan 2018). To optimize e-commerce, the government has considered accelerating e-commerce development, startups, business expansion and logistics by setting an integrated e-commerce value-added. The regulation addresses eight aspects: (1) funding, (2) taxation, (3) consumer protection, (4) education and human resources, (5) logistics, (6) develop broadband network connection, (7) cyber security and (8) establishing executor management. One of the priority areas is to accelerate the development of communication infrastructure, specifically in rural areas. It can overcome the infrastructure gap by connecting the network in all areas. It has become the main issue considering the fact that Indonesia consists of more than 17,500 islands, most of which are highlands. In addition, Indonesia is one of the largest archipelagos and has been ranked the 4th largest populated country in the world.

1.2. Importance of the Study

A previous study found that there is a negative effect of trade-related limitations in telecommunication and computer services on trading activities in manufactured goods (Nordås and Rouzet 2015). Evidently, the data from the OECD indicates that services reflect nearly 50% of exports in terms of value-added. Transport, communications, finance, logistics, and other professional and business services are important to export activities and to coordinate global value chains. In fact, efficient ICT services also contribute to enhancing the competitiveness, trade, and productivity in an economy, in services as well as manufacturing.

Moreover, more internet connections correspond to more exports of branded goods at higher prices in several manufacturing sectors, mostly electronics. An increase in telecoms density of 10% is estimated with 2% - 4% higher export prices in the electronics sector. Furthermore, an increase in intra-industry trade in the sector by 7% - 9%, depending on the initial density (OECD 2014b).

In particular, there are not many in-depth analysis related to the role of business services in the ICT industry. A previous study for the period of 2000-2006 resumes that the contribution of ICT industry only affect the economic growth in high and upper-middle income groups, but not in the lower-middle income group countries (Yousefi 2011). The result on this study is similar with other study which concludes that there was insignificant role of ICT industry in Indonesian national economy in 1990-2005, although the researcher has used a different approach; Structural Decomposition Analysis (Zuhdi, 2012) and simple Output Multipliers method (Zuhdi, 2014).

1.3. The Objectives of Study

This study is conducted to analyze the role of ICT industry on the national economy of Indonesia; by comparing Indonesia's case with developed economies such as Korea, the United States (US), France, the United Kingdom (UK), Denmark and Netherlands that have advanced ICT sectors. Moreover, this study will analyze the impact of service input in ICT industry on economic growth of each sample country. For this purpose, the researcher will adopt a quantitative methodology by using the input-output table in each country over 4 years (1995, 2000, 2005 and 2011). Analysis on time series will guide the researcher to understand the causes leading to a particular trend data. Those data will be retrieved from the OECD database. In addition, the Value-Added Multiplier (VAM) of total final demand approach will be used to estimate the economic impact.

1.4. Research Questions and Hypothesis

The major question is defined as follows: what are the impacts of business service in the ICT industry on the economic growth of Indonesia? Other questions will include: 1) what is the relationship between VAM of total final demand and share of business service in ICT industry? 2) Which service product in ICT industry has the highest value of VAM? 3) Which sector in ICT industry has the highest level of labor productivity? 4) What are the policy implications of on the ICT industry development? These questions will be guided by the hypothesis that an increase in business service input increases the value-added of ICT products.

LITERATURE REVIEW

2.1. The Importance of ICT industry on Economic Growth

Researchers have conducted studies to analyze the importance of ICT in the national economy. Yousefi (2011) concludes that the ICT industry development only affects the economic growth in high and upper-middle income groups, but not in the lower-middle income group countries. The investment level in the ICT industry did not become the trigger of the sluggish growth in the lower-middle income groups. However, the empirical studies conducted by Cardona, Kretschmer, and Strobel (2013) demonstrate a different result. ICT also plays an imperative role in the productivity statistics. The further research indicates that there is a positive and significant effect on level of productivity and it has increased rapidly over time. Compared to the previous study, it can be concluded that the role of the ICT industry has recently become more important for the national economy.

In particular, Erumban and Das (2016) found the similar result in the Indian economy that the role of ICT investment is becoming more important, mainly in the service sector. However, the economy has not yet optimized the usage of ICT due to unsuccessful result in export activities. The manufacturing sectors are still left behind although the productivity growth has increased in ICT services. In fact, the efficiency has been improved by developing the export-oriented ICT sector as part of a service economy. Broadly, Lee and McKibbin (2018) also conclude that the sustained and balanced growth of Asian economies are driven by the rapid productivity growth in the service sector in Asia. It means that the previous studies indicate the

significant improvement in productivity level of service sector in Asian, especially ICT service sector in India.

Other studies analyzed the ICT's effect on labor productivity in developed countries. The contribution of ICT has inclined over time to the labor productivity's growth in Korea's economy, by reviewing the changes of productivity among industries between the 1990s and 2000s. Other studies used sensitivity analysis to confirm that there are excess effects of ICT on the growth of total factor productivity (TFP), induced by the export environment and the productivity influences of human capital (Jung, Na, and Yoon 2013). Similarly, a study concludes that there is a significant correlation between the usage of ICT intensively with the growth of average labor productivity (ALP) and value-added at the sector level in Singapore (Vu 2013). It means that both studies have shown that the contribution of ICT to labor productivity has improved over time in developed countries in Asia.

In the middle of 1990s, several researchers confirmed that there is a positive correlation between investment in ICT industry and economic performance in aggregate amount (Oliner and Sichel 2003; Wan, Fang, and Wade 2007; Jorgenson, Ho, and Stiroh 2007; Kretschmer 2012; Bloom, Sadun, and and Reenen 2012). Moreover, it has been recorded that the contribution of ICT investment was 0.2% - 0.6% of annual GDP growth in OECD countries for the last decade (OECD 2014a). On the other hand, the new forms of ICT service are getting more and more important nowadays and it has a significant impact on the economy, such as e-commerce, e-banking, e-health, e-learning, and others services (European Commission 2006; Nemer 2015).

Based on the OECD Trade in Value-Added database (2011), the ICT industry (both manufactured goods and services) covered 6.7% of total value-added included in manufacturing

exports from OECD countries. Manufactured ICT goods, consisting of computers, electronic or optical equipment covered 4.4% of the total ICT value-added in OECD economies' manufacturing exports. ICT services, consisting of post and telecommunications, computer or related business services, accounted for the rest of 2.3%.

2.2. Input-Output Analysis to determine the Role of ICT industry on Economic Growth

Some studies have applied Input-Output analysis to evaluate the impact of ICT industry in national economy, how the intensive investment and the usage of ICT are able to help boost the growth of national economy. In general, the studies show that the development in ICT industry contributes to positive results and plays a key role in national economy. The previous study (Mattioli and Lamonica 2013) has covered 40 countries for the period of 1995-2009 to assess the economic structure of ICT by using the world input-output table. They used Rasmussen forward and backward linkage indices to analyze the data. The result shows that ICT industry has an effect of multiplier on other industry. It means that ICT industry plays an important part in those economies.

However, the study conducted for Croatian economy in 2010 shows no significant differences between the ICT multipliers and multipliers of other sectors. ICT service sector generates the largest values of multipliers. In addition, this study conducted a multiplier analysis of ICT sectors, divided into two groups among European Union member states: new and long-standing group. The major finding is that the usage of ICT and also its implementation have a lower contribution to growth and development in the economy of new member states than long-standing member states (Keček, Žajdela Hrustek, and Dušak 2016).

Moreover, decomposition analysis using IO tables has been done by previous study (Zuhdi, Mori, and Kamegai 2012). The aim of this study is to analyze the role of ICT sectors to the change of economy structure of Indonesia (1990–2005) and Japan (1995– 2005). The result shows that ICT sectors have the larger contribution in Japan's economy than in Indonesia. For the same purpose, the researcher also conducted different approach by using simple output multipliers method in IO analysis to analyze Indonesia's economy for the period 1990-2005 (Zuhdi 2014b). The result still remains the same in this study. The same researcher (Zuhdi 2014a) applied a demand-pull IO quantity model to evaluate the impacts on the total output of ICT industries in Indonesia if the final demand changed. The results show that if the households' consumption changed, it impacts the total output significantly and positively in ICT sectors, but conversely, it negatively impacts import activities. Therefore, the import restriction policies for ICT products was recommended by the researcher in this study.

According to the Services Trade Restrictiveness Index (STRI) published by OECD (2017), telecommunications is one of the business service, which has the highest score relative to the average in Indonesia. In general, services sector accounts for about 10% of Indonesia's exports and about 15% of its imports. The service share in value-added terms is significantly higher for imports at 45% compared to exports at 28%. It means that Indonesia imports services-intensive goods. Services also account for a higher share of employment (46%) than of GDP, indicating that labor productivity is lower in services than in other sectors. It illustrates that the result of the previous study that Indonesia is still highly dependent on the import of ICT products, is still valid.

2.3. Definition and classification of the ICT Industry

The OECD database of Input-Output Tables (IOTs) consist of 34 industry classifications, which refers to International Standard Industrial Classification (ISIC) Rev.3.1. Specifically, the determination of the ICT industry according to ISIC Rev. 3.1 (United Nations 2002) must cover the several points:

a. The products produced by a candidate company in manufacturing sectors, must be designated to fulfill information processing and communication functions (including transmission and display), or must use electronic processing to detect, measure and/or record physical phenomena or to control of physical process;
b. The products produced by a candidate industry in services sectors, must be designated to enable the function of information processing and communication by electronic devices.

This determination of ICT is comparable internationally. It also gives a statistical basis used to quantify the economic activity resulted in the production of ICT goods and services. According to ISIC Rev.3.1, two main groups of ICT activities are manufacturing industry and ICT services industry (see detail in Table 1, Appendix B).

There are some classes of industry that are classified as ICT sector according to ISIC Rev.3.1 but are not included in this study because these classes are only a part of Division, not cover all classes as a whole (see detail in Table 2, Appendix B).

In conclusion, there are three industries in IOTs that are classified as ICT sector and used in this study: computer, electronic and optical equipment, post and telecommunications, and computer and related activities.

DATA AND METHODOLOGY

3.1. Input-Output Tables

The main data sources used in this study are Input-Output Tables (IOTs) for the period 1995, 2000, 2005 and 2011. IOTs are the statistical basis of Input-Output analysis that was retrieved from the OECD database.

Here, IOTs illustrate the relationships of sales and purchases between producers and consumers in a national economy. IOTs also illustrate the flows between the sales and purchases (both final and intermediate) of industry or product output. It shows the usage of outputs from each sector, as inputs for other sectors (OECD, 2017).

The latest set of IOTs provides inter-industrial flow matrices of domestic and imported goods and services. The data is provided in current prices (USD million) for 61 countries, consist of 34 member economies and 27 non-member economies (including all G20 countries) with the coverage period of 1995-2011 (OECD, 2017).

3.2. Value-Added Multiplier

Input-Output model is generally used to assess the impact of exogenous changes in components on a national economy (Miller and Blair 2009). Furthermore, the impact of inter-industrial flows on the total production of each industry in the IOTs can be obtained from the basic equation in the Input-Output model. Below is the equation that expresses the dependence for sector i.

$$X_i = \sum_j X_{ij} + Y_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

X_i = total output of sector i

X_{ij} = the amount of a product from sector i used as an intermediate input in production by sector j

Y_i = the final demand of sector i (where i, j = 1,…,n)

The above equation (1) can be written in matrix form for the entire economy to define the technical coefficient $a_{ij} = \frac{X_{ij}}{X_j}$ as a ratio of a product from sector i that is needed by sector j to generate one unit of its product.

$$X = AX + \mathrm{Y} \quad \text{..... (2)}$$

Where $X = \begin{bmatrix} X_i \\ \vdots \\ X_n \end{bmatrix}$, $A = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$ and $Y = \begin{bmatrix} Y_i \\ \vdots \\ Y_n \end{bmatrix}$

Matrix A is called the technology matrix. A solution to the equation (2) is:

$$X = (I - A)^{-1}Y \quad \text{..... (3)}$$

I = n-by-n identity matrix

$(I - A)^{-1}$ = The Leontief Inverse matrix

The Leontief Inverse matrix is used to quantify the change in total output due to the change in final demand. It is also known as a multiplier matrix. According to Miller & Blair (2009), there are several types of multipliers that are often applied: (a) outputs, (b) income, (c) total employment and (d) value-added.

In this study, IO analysis is used to compute simple multiplier by using open IOTs, which consist of all production sectors (except households). In open IOTs, the effects per unit of final demand (direct and indirect) are indicated by all components of the Leontief Inverse matrix. Simple multipliers are computed as the ratio of the direct and indirect effect to the initial effect

individually. The output of each sector of the economy is the sum of the j-th column of the multiplier matrix, as needed per unit of final demand of sector j. The initial output means the initial monetary unit's worth of sector j output needed to satisfy the additional final demand. Hence, the equation for the sector j is determined as:

$$O_j = \sum_{i=1}^{n} \alpha_{ij} \text{ (where } j = 1,\ldots,n) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

v_i = value added of sector i

Value-added can be calculated by subtract the cost of its intermediate inputs from the total output of a sector. Hence, some debate that value-added is preferable in evaluating the contribution of a certain sector to an economy than, for example, total output (Miller and Blair 2009). Here, to compute the simple value-added multiplier for the sector j, the j-th column of the multiplier matrix is multiplied by the value added produced per unit of its output. Therefore, the equation is:

$$V_j = \sum_{i=1}^{n} \alpha_{ij} . \frac{v_i}{X_i} \text{ (where } j = 1,\ldots,n) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

where v_i represents value added of sector i.

EMPIRICAL RESULT AND ANALYSIS

4.1. Coefficient Analysis

A. Input Structure

Figure 2 (Appendix A) and Table 5 (Appendix B) show the trend of ICT products usage in an average of the ICT industry in sample countries. As mentioned in the previous chapter, there are three products classified as ICT products: (1) computer, electronic & optical equipment, (2) post and telecommunications, and (3) computer and related activities. The composition of ICT products in input structure has increased significantly, especially in Korea, Denmark, and Indonesia, from 27.83%, 11.95%, and 7.18% in 1995 to 38.27%, 25.92% and 15.60% in 2011, respectively. This indicates that on average, ICT products have become more important in ICT industry. However, this trend was not reflected in the US and the UK. During 2000-2011, the usage of ICT products has decreased rapidly in those countries from 23.81% and 17.26% in 2000 to 15.08% and 13.39 in 2011, respectively.

When comparing input structure among sample countries which are classified in manufactured goods (see detail in Table 3 - Appendix B), almost all sample countries have reduced the usage of manufactured goods in average ICT industry during 2000-2011, as shown in Figure 3 (Appendix A) and Table 6 (Appendix B). In this case, the Netherlands and Denmark had the smaller shares, decreased from 17.81% and 13.27% in 1995 to 9.38% and 5.97% in 2011, respectively. However, Korea was the only country that has shown positive growth in an average of ICT industry, from 40.99% in 1995 to 51.18% in 2011.

In all sample countries, business service of ICT industry has become more imperative in economic growth. As shown in Figure 4 (Appendix A) and Table 7 (Appendix B), the contribution of business service has inclined during 1995-2011 in some sample countries i.e. the Netherlands, Denmark and France increased from 32.22%, 25.44%, and 22.38% to 43.18%, 43.50%, and 36.61%, respectively. The classification of business service can be seen in Table 4, Appendix B. However, it should be noticed that there are some countries that have decreased the usage of business service, especially during 2000-2011. In 2000, the input of business service in the ICT industry in the US, Korea, and Indonesia was around 29.22%, 20.57%, and 25.17% respectively. However, in 2011, it has slightly decreased to 25.58%, 19.16%, and 16.91%, respectively.

In any case, there are four service products that can be classified in Hi-Tech service: (1) post and telecommunication, (2) financial intermediation, (3) computer and related activities, and (4) R&D and other business activities. Figure 5 (Appendix A) and Table 8 (Appendix B) show that in almost all sample countries, Hi-Tech service has increased during 1995-2011. However, the usage of Hi-tech service in Indonesia shows an opposite trend. Conversely, it has decreased from 9.98% in 1995 to 8.70% in 2011.

Furthermore, input structure of the ICT Industry also can be classified as ICT service: (1) post and telecommunication and (2) computer and related activities. It has increased in all sample countries during 1995-2011, as shown in Figure 6 (Appendix A) and Table 9 (Appendix B). ICT service in Denmark, France and the Netherlands has increased significantly from 5.21%, 5.18%, and 4.69% in 1995 to 22.73%, 14.74%, and 11.12% in 2011, respectively. Similarly, Indonesia has slightly increased from 2.31% in 2000 to 4.84% in 2011.

B. Output Allocation

In all sample countries, the composition of export in ICT products on average of the ICT industry has decreased during 2000-2011 as shown in Figure 7 (Appendix A) and Table 10 (Appendix B). The decrease occurred in the UK, Netherlands, and Korea from 17.79%, 29.39% and 27.02% in 2005 to 8.75%, 23.53% and 21.21% in 2011, respectively. Almost all sample countries focused on export in manufactured ICT goods (computer, electronic and optical equipment). On average, it covered more than 60% of total ICT products, while the other ICT products classified as service product (Post and telecommunications; Computer and related activities) covered less than 20%.

Although the amount of exports has increased, the increased amount of ICT products is still lower than the increased amount of other products. For example: in Korea, the export of product coke, refined petroleum products, and nuclear fuel has inclined significantly from USD 17,159 million in 2005 to USD 55,835 million in 2011 or an increase of about 200%. On the other hand, ICT products, especially computer, electronic and optical equipment, has inclined from USD 87,215 million in 2005 to USD 122,259 million in 2011 or an increase of 40%.

As shown in Figure 8 (Appendix A) and Table 11 (Appendix B), shares of ICT product in total imports in almost all sample countries has increased during 1995-2000 but afterward, it declined during 2000-2011. Conversely, Indonesia has increased the composition import of ICT products in the ICT industry from 3.93% in 2000 to 7.54% in 2011. Indonesia, in fact, highly depends import activities not only related to the ICT industry but also to other industries such as mining, electrical machinery, machinery and equipment, motor vehicle, and other sectors.

C. The share of the ICT industry in Terms of Value-Added and Gross Output

As seen in Figure 9 (Appendix A) and Table 12 (Appendix B), the share of the ICT industry in terms of value-added rose during 1995-2000 in all sample countries, but began to decrease until 2011. Korea has the highest share of value-added among all sample countries, although the share fell slightly from 9.67% in 2000 to 8.83% in 2011. However, Denmark and Indonesia have recorded a remarkable increase of share in value-added during from 4.09% and 1.34% in 1995 to 5.10% and 4.72% in 2011, respectively.

Similarly, the share of ICT industry in terms of gross output rose during 1995-2000 in almost sample countries, but began to decrease until 2011 (see Figure 10 - Appendix A and Table 13 - Appendix B). Korea also has the highest share of gross output among all sample countries. It increased significantly from 8.17% in 1995 to 12.43% in 2000, but then declined slightly to 11.12% in 2011. However, Indonesia showed a significant increase from 1.35% in 1995 to 4.36% in 2011.

D. Demand and Supply

Figure 11 (Appendix A) and Table 14 (Appendix B) show that the share of imported intermediate inputs in domestic intermediate inputs in almost all sample countries has increased during 1995-2011. However, the share of Indonesia shows the opposite trend. It has declined sharply from 40.81% in 2000 to 33.20% in 2011. The Netherlands has the highest share among those countries by 111.44% in 2011, a significant increase from 94.93% in 2005.

The trend in Figure 12 (Appendix A) and Table 15 (Appendix B) shows the increase in the share of total intermediate input in total input on average of the ICT industry in all sample countries during 1995-2000. But then, it declined during 2000-2005 in some countries i.e. US,

UK, France, Netherlands, and Indonesia, while it remained stable in Korea and Denmark. Subsequently, there was a significant increase in Korea and France from 67.02% and 48.71% in 2005 to 72.35% and 53.05% in 2011. In this case, Korea has the highest share of total intermediate input in total output.

As shown in Figure 13 - Appendix A and Table 16 – Appendix B, almost all sample countries experienced an incline in the share of total value-added in total input on average of the ICT industry, especially during 2000-2011. The trend of increment can be seen in the US, the UK, and Indonesia from 46.32%, 49.24%, 43.123% in 2000 to 59.24%, 54.83% and 54.95% in 2011, respectively. On the contrary, Denmark, France, and Korea show a decrease from 55.06%, 53.77% and 36.17% in 1995 to 46.20%, 45.71% and 27.05% in 2011, respectively.

4.2. Labor Productivity

Figure 14 (Appendix A) and Table 18 (Appendix B) show that the labor productivity in all industries in all sample countries has increased significantly, especially during 2000-2011. In this case, Indonesia has the lowest labor productivity in all industry among sample countries, increased from 2.63% in 1995 to 7.37% in 2011. Meanwhile, Denmark has the highest labor productivity, sharp increase from 79.46% in 2005 to 104.56% in 2011. In the case of Indonesia, although there was a significant increase in value-added from USD 276,166 million in 2005 to USD 815,181 million in 2011 or 195% growth, it was also followed by the increase in employment from 95,201 thousands persons in 2005 to 110,583 thousands persons in 2011 or 16% growth. In contrast, there was no growth of employment in Denmark, while the amount of value-added increased by 31% during 2005-2011 (See Table 17 in Appendix B). Therefore, there was a large gap in labor productivity between Indonesia and Denmark during those period.

Although labor productivity in the ICT industry in all sample countries shows the significant increase during 1995-2011, it can be seen clearly from Figure 15 (Appendix A) and Table 20 (Appendix B) that there was a gap between Asian countries (Indonesia and Korea) and other countries since 1995, especially the US. In 2011, Korea and Indonesia reached the lowest rate of 48.39% and 45.16%, respectively, while the US has achieved 179.91%.

The trend shown in Figure 16 (Appendix A) is still in line with Figure 15 that illustrates the increase in labor productivity in the industry of computer, electronic & optical equipment (manufactured ICT goods) in all sample countries. The US still has the highest rate which reached 200.89% in 2011. The significant increase has occurred in Indonesia from 55.82% in 2005 to 108.77% in 2011. It means that one of the largest contributors to labor productivity in the ICT Industry in Indonesia came from this industry. However, labor productivity of this industry in France slightly declined from 79.25% in 2005 to 64.41% in 2011 and it became the lowest rate compared to other countries in that year.

Previous study by Lee and McKibbin (2018) has confirmed that there is still a large difference in the service sectors between Asian countries and the US in terms of labor productivity. As illustrated in Figure 17 (Appendix A), labor productivity in the post and telecommunication industry (ICT service) has increased during 2000-2011 in all sample countries. The US has reached the highest rate among all sample countries in all period and increased from 108.34% in 1995 to 212.16% in 2011. On the other hand, labor productivity in Korea remains stable and reached the lowest rate from 12.85% in 1995 to 21.84% in 2011. However, this study found that the gap of labor productivity in this industry has become smaller and smaller between Indonesia and the US. It is clear that there was a remarkable increase of

labor productivity in Indonesia from 38.29% in 2005 to 155.98% in 2011, although previously it has decreased from 38.48% in 1995 to 9.25% in 2000. It can be concluded that this industry also gave a big contribution to labor productivity in the ICT industry in Indonesia.

Computer and related activities are also one of industry classified as ICT service in Indonesian economy. As shown in Figure 18 in Appendix A, labor productivity in this industry has increased significantly in almost all sample countries during 2000-2011. Conversely, it has declined sharply in Korea and Indonesia during 1995-2011. Therefore, there was a large gap in labor productivity between the US (136.73%) and those Asian countries in 2011. It means that it is in line with the result from the study conducted by Lee & McKibbin (2018).

4.3. Value-Added Multiplier (VAM)

Figure 19 (Appendix A) and Table 21 (Appendix B) show that the value of VAM of total final demand in almost all sample countries decreased during 1995-2000. In this case, the US has the highest value of VAM among countries, which reached 0.926 in 1995 but decreased to 0.902 in 2011. On the other hand, Korea has the lowest value of VAM among countries that fell sharply from 0.789 in 1995 to 0.656 in 2011. Indonesia also experienced the same trend during 1995-2005. The value of VAM decreased during 1995-2005; afterward, it increased from 0.818 in 2005 to 0.839 in 2011 but it was still lower than the value of VAM in 1995 (0.862).

Figure 20 - 22 in Appendix A and Table 22 – 24 show the value of VAM of individual product classified in ICT products. As can be seen in Figure 20 (Appendix A) and Table 22 (Appendix B), the value of VAM for computer, electronic & optical equipment tend to increase in the US and Denmark from 0.7770 and 0.686 in 1995 to 0.862 and 0.727 in 2011, respectively. Conversely, in the case of Korea and France, it declined from 0.697 and 0.771 in 1995 to 0.556

and 0.683 in 2011. The figure also indicates that the US has the highest value of VAM, while Korea has the lowest VAM among sample countries. It decreased from 0.697 in 1995 to 0.556 in 2011.

Figure 21 (Appendix A) and Table 23 (Appendix B) show that the value of VAM for post and telecommunications in all sample countries generally decreased during 1995-2011, except Indonesia. Although the Netherlands recorded an increasing value of VAM from 0.798 in 2000 to 0.839 in 2005 it went down to 0.801 in 2011. In this case, Indonesia reached 0.9540 in 2011, which was the highest value of VAM among sample countries. However, Korea and Denmark had the same value of VAM (0.764 in 2011). It decreased from 0.902 and 0.889 in 1995, respectively.

As can be seen in Figure 22 (Appendix A) and Table 24 (Appendix B), the trend of value of VAM for computer-related activities decreased in all sample countries during 1995-2011. The highest value of VAM was the US which reached 0.968 in 1995 but then decreased to 0.942 in 2011. Meanwhile, the lowest value of VAM in 2011 was 0.786 (Denmark), a decrease from 0.875 in 1995.

VAM of ICT products can be calculated by combining three individual products included in the ICT industry: (1) computer, electronic & optical equipment; (2) post and telecommunication and (3) computer and related activities. The result shown in Figure 23 (Appendix A) and Table 25 (Appendix B) indicate the increase in the value of VAM for ICT products during 1995-2011. Definitely, US has the highest value of VAM among sample countries in those periods, an increase from 0.8500 in 1995 to 0.8610 in 2011. The similar trend also occurred in Denmark and Indonesia, started to increase from 0.7890 and 0.7720 in 2000 to

0.8470 and 0.8560 in 2011. In contrast, Korea shows a significant decline from 0.7310 in 1995 to 0.6060 in 2011 which also indicates that Korea has the lowest value of VAM for ICT products among sample countries.

In conclusion, the increase in the value of VAM in ICT products mainly was driven by the increase in the share of total value-added and total intermediate input on average of the ICT industry in Indonesia. Although there was an increase in the value of VAM in manufactured ICT goods (computer, electronic & optical equipment) from 0.582 in 1995 to 0.679 in 2011, the value of VAM in that industry was still lower than the value of VAM in ICT services. In 2011, the value of VAM in post and telecommunications was 0.954 and the value of VAM in computer and related activities was 0.862. It can be concluded that ICT services (post and telecommunications and computer and related activities) are the larger contributor to the value of VAM in ICT products than manufactured ICT goods.

CONCLUSION

5.1. Main Conclusion

The contribution of business service in value-added in the ICT industry is higher than ICT manufactured goods. Evidently, value-added of IT and information services have increased significantly, while value-added of ICT manufacturing has slightly decreased. However, total value-added and value-added in the ICT sector are steady since the crisis in the global economy occurred in 2008. Hence, this study analyzes the role of the ICT industry on Indonesia's economic growth, especially ICT service, using the Input-Output method to compute simple value-added multipliers. A comparative analysis multiplier was performed for ICT industry of Indonesian economy and also some developed countries such as Korea, the United States (US), France, the United Kingdom (UK), Denmark and Netherlands for the period of 1995, 2000, 2005 and 2011.

In general, the input-output structures of the sectors will generate a significant difference in VAM of individual products because each sector produces various products. In fact, the bigger VAM is produced by the higher share of domestic intermediate inputs and value-added inputs. Based on empirical results in this study, it implies that the increase in the value of VAM in ICT products mainly was driven by the increase in the share of total value-added and total intermediate input on average of the ICT industry in Indonesia. Although there was an increase in the value of VAM in manufactured ICT goods (computer, electronic & optical equipment), the value of VAM in that industry was still lower than the value of VAM in ICT services. In 2011, the value of VAM in post and telecommunications was 0.954 and the value of VAM in computer

and related activities was 0.862. It can be concluded that ICT services (post and telecommunications and computer and related activities) are the larger contributor to the value of VAM in ICT products than manufactured ICT goods.

Furthermore, this study found that the labor productivity in the industry of computer, electronic & optical equipment (manufactured ICT goods) has increased in all sample countries. The significant increase has occurred in Indonesia from 55.82% in 2005 to 108.77% in 2011. Similarly, labor productivity in post and telecommunication industry (service product) has increased during 2000-2011 in all sample countries. Moreover, this study found that the gap of labor productivity in post and telecommunication industry has become smaller and smaller between Indonesia and the US. It is clear that there was a remarkable increase of labor productivity from 38.29% in 2005 to 155.98% in 2011, although previously it has decreased from 38.48% in 1995 to 9.25% in 2000. It means that the largest contributors to labor productivity in the ICT Industry in Indonesia came from these industries.

Nevertheless, this study limits the sample only on certain OECD members and specific period available in the OECD database (the latest data is 2011). Therefore, future studies could try to attempt more sample of non-OECD members and use the update period (after the year 2011). It is also suggested to use different classification of ICT sector defined by ISIC Rev.4.

5.2. The Implication to Indonesia's Policy

This study also found similar result from the study conducted by Erumban and Das (2016) in the Indian economy. The ICT service sector in the Indonesian economy increased rapidly since 2005, as well as the productivity growth (both in goods and service product). By optimizing the usage of ICT service in export-oriented ICT sector and lessen the dependency on

import activities, it can boost the value-added of ICT industry and the economic growth of Indonesia.

According to the state budget of Indonesia (Minister of Finance, 2018), the growth of the ICT sector is predicted to be 10% of GDP in 2018. Service sector, mainly in the ICT sector, transportation, and financial services, has shown good performance during 2014-2017. In this case, the ICT sector has increased 9.6% on average, supported by faster growth of IT and e-commerce.

Furthermore, Minister of Trade of Indonesia stated that the target of export growth in 2018 is 11% of total export in the previous year. It means that the Indonesian government is aware that export activities are able to boost Indonesian economic growth effectively. Currently, the government of Indonesia has determined five industrial sectors for export orientation. These sectors are the oil and gas mining industry, agribusiness and fisheries, Indonesia's leading industries, labor-intensive industries, and the tourism and creative industries. It means that Indonesia does not focus on a specific branding or featured product that can contribute to value-added largely. In this case, E-commerce has enormous potential for the Indonesian economy. Service exports can be improved, among others, by the development of e-commerce, technology, and internet-based business, as well as the export potential of services in the fields of design, architecture, accounting, and communication and information technology.

APPENDIX A

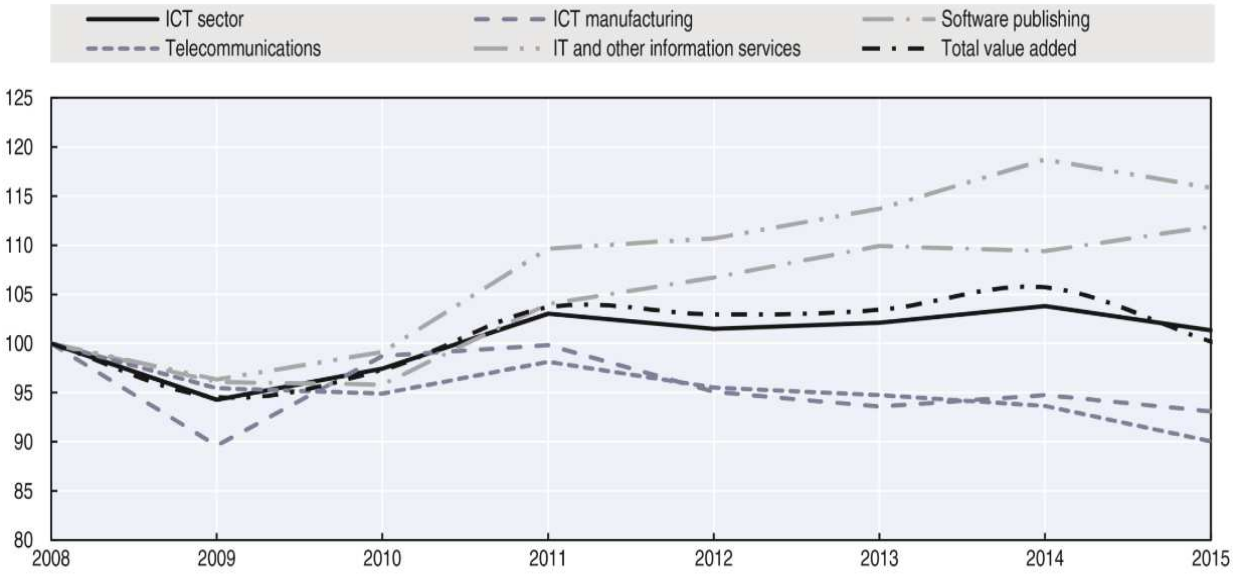

Figure 1. Growth in value-added of the ICT sector and its sub-sectors in the OECD area

Source: OECD (2017), OECD Digital Economy Outlook 2017, OECD Publishing, Paris.

Retrieved from http://dx.doi.org/10.1787/9789264276284-en

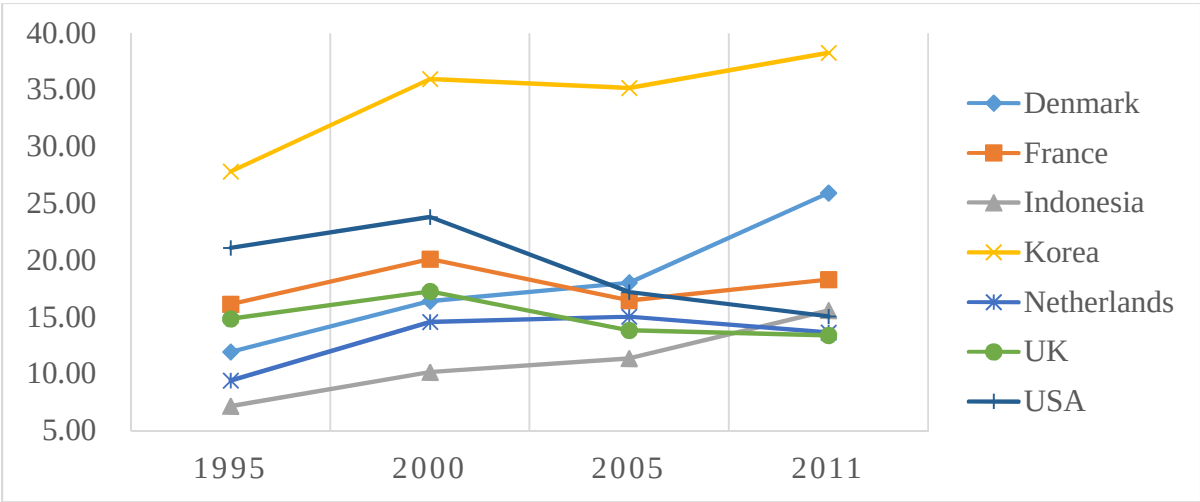

Figure 2. Trend of input structure - ICT products of total input on average of the ICT industry

Source: calculated by author using OECD's Input-Output Tables

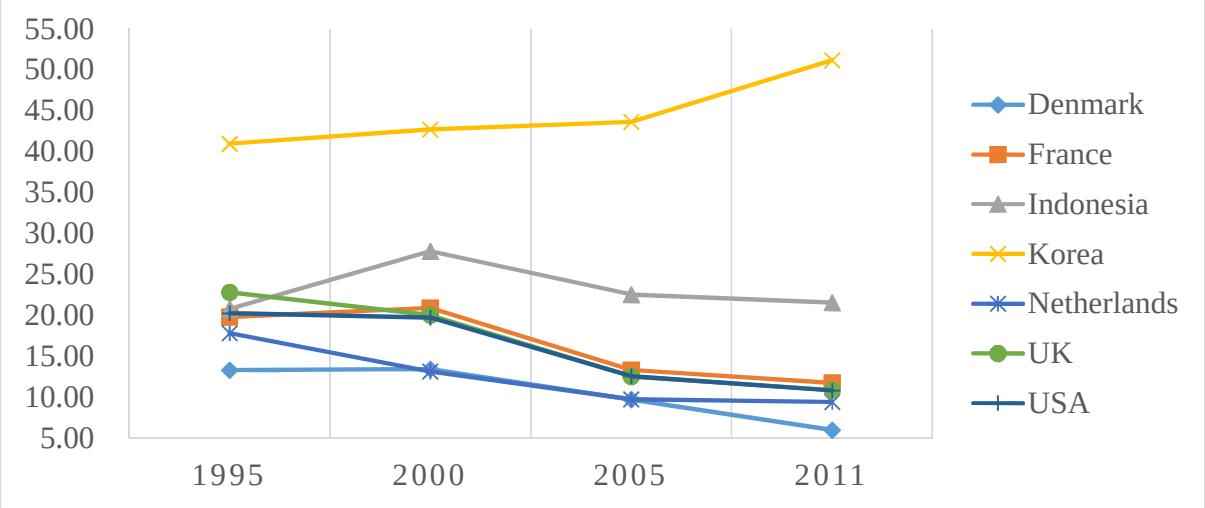

Figure 3. Trend of input structure – manufactured goods of total input on average of the ICT industry

Source: calculated by author using OECD's Input-Output Tables

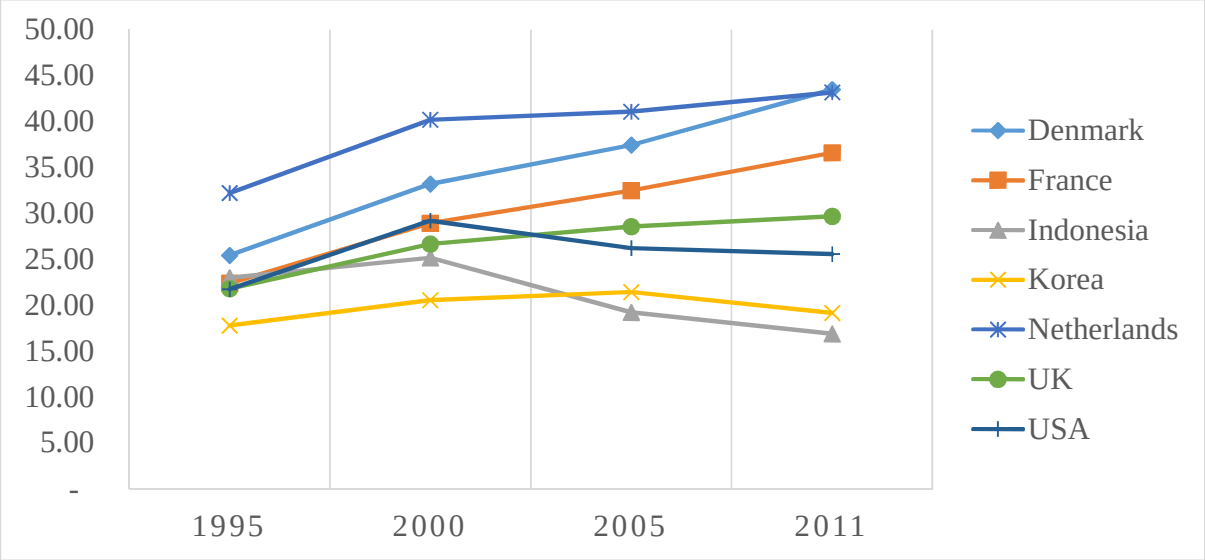

Figure 4. Trend of input structure – business service of total input on average of the ICT industry

Source: calculated by author using OECD's Input-Output Tables

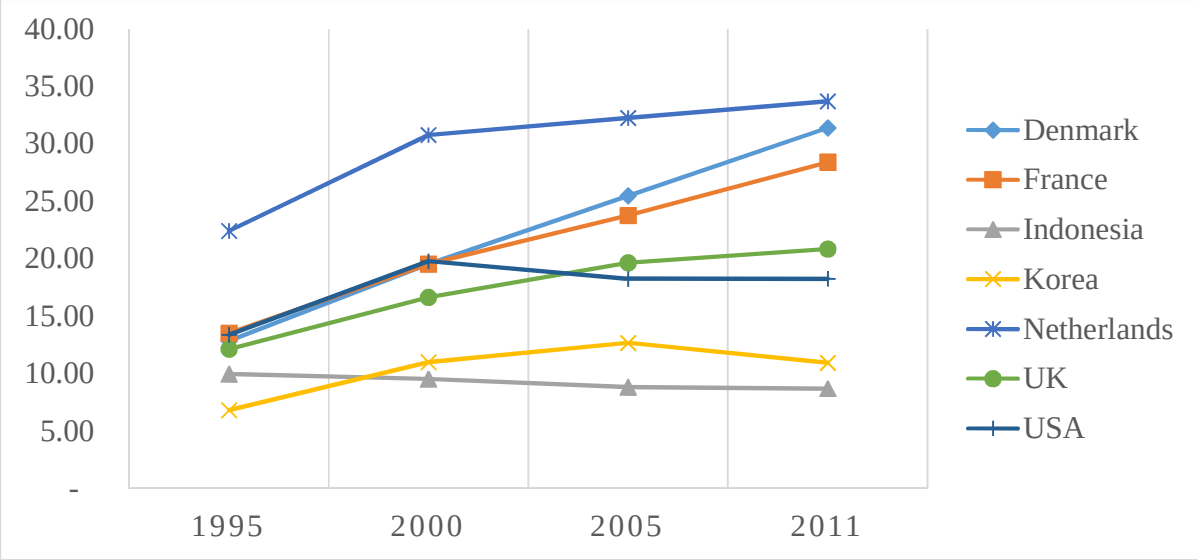

Figure 5. Trend of input structure – Hi-tech service of total input on average of the ICT industry

Source: calculated by author using OECD's Input-Output Tables

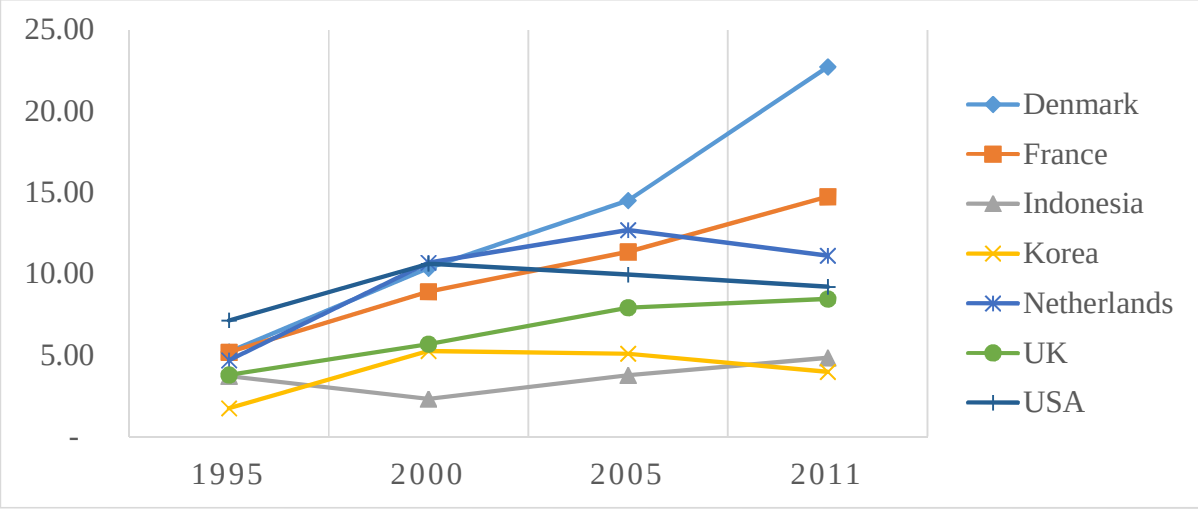

Figure 6. Trend of input structure – ICT service of total input on average of the ICT industry

Source: calculated by author using OECD's Input-Output Tables

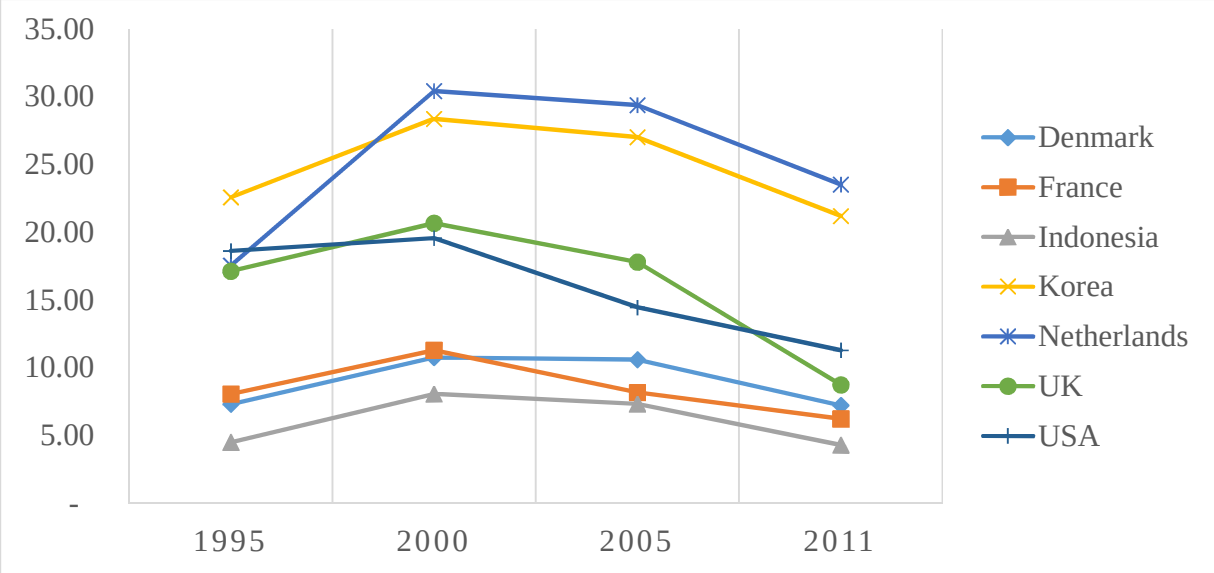

Figure 7. Exports composition in the ICT industry

Source: calculated by author using OECD's Input-Output Tables

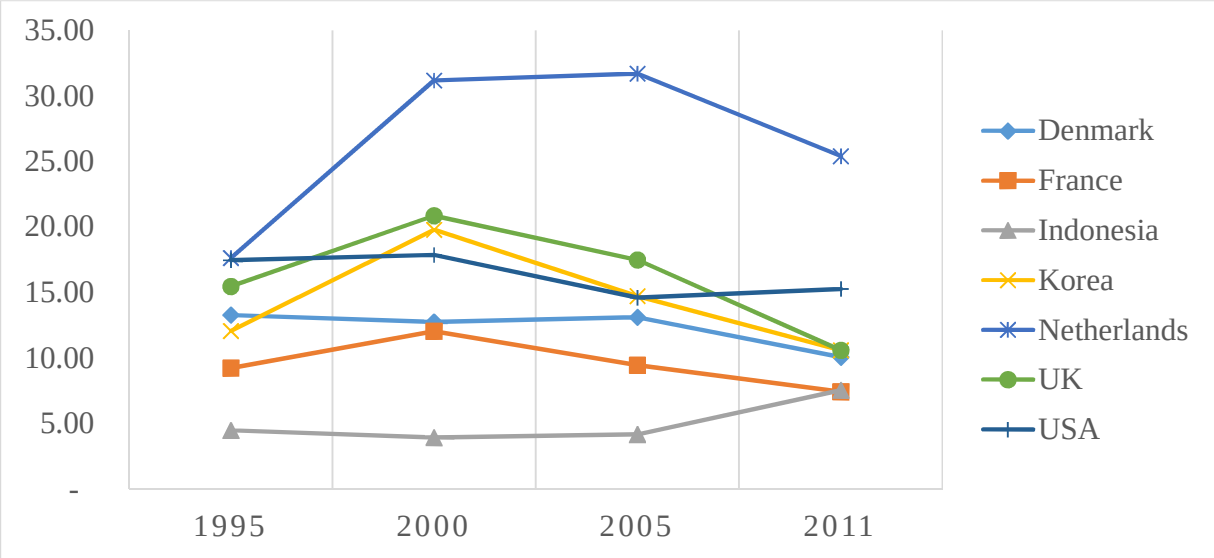

Figure 8. Shares of ICT product in total imports

Source: calculated by author using OECD's Input-Output Tables

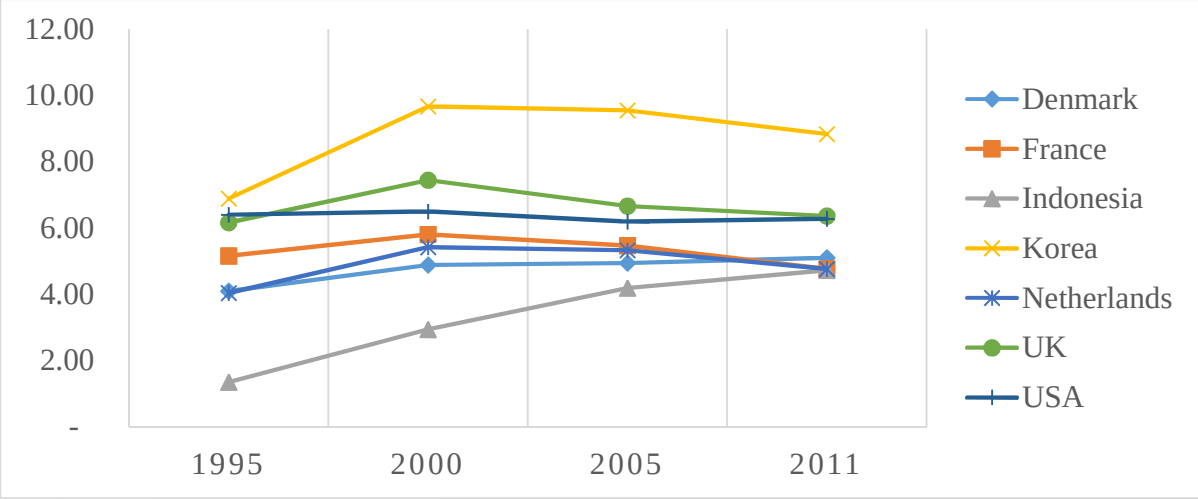

Figure 9. Share of ICT industry in terms of GDP (value-added)

Source: calculated by author using OECD's Input-Output Tables

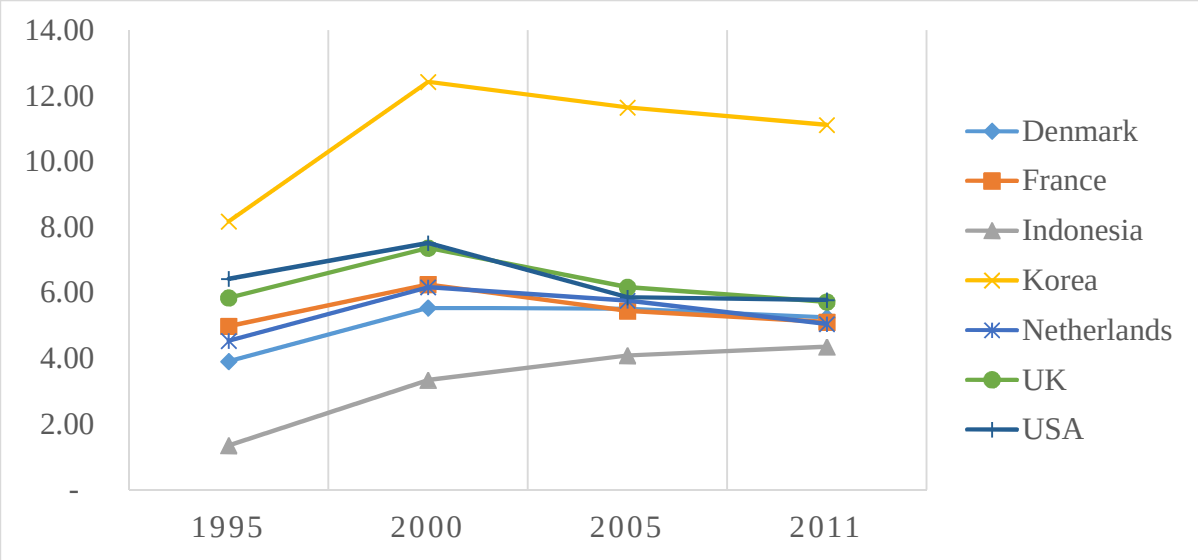

Figure 10. Share of ICT industry in terms of gross output

Source: calculated by author using OECD's Input-Output Tables

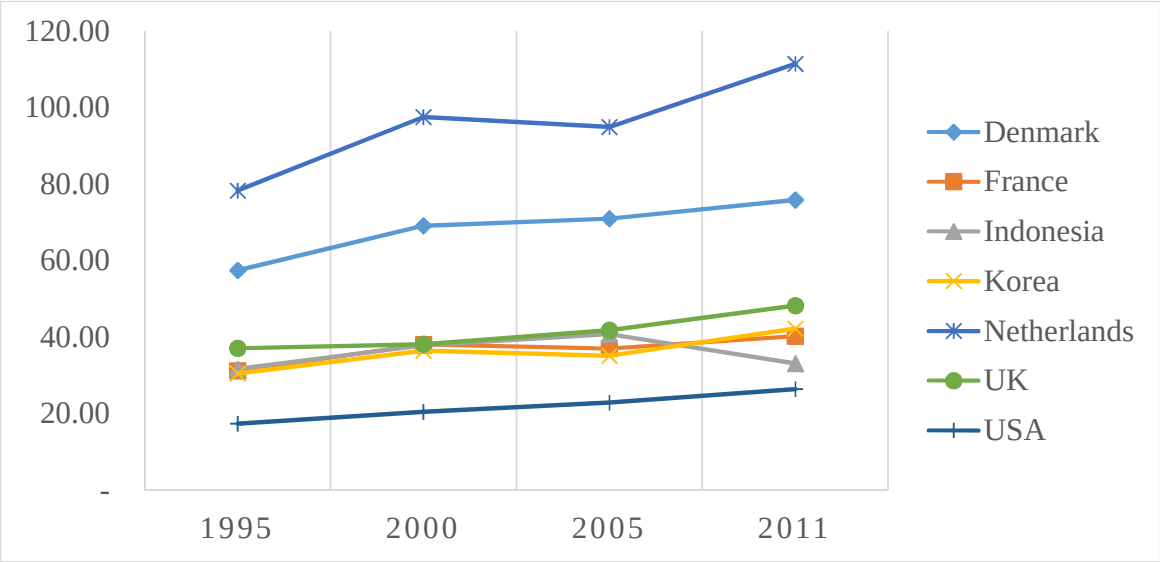

Figure 11. Share of imported intermediate inputs in domestic intermediate inputs

Source: calculated by author using OECD's Input-Output Tables

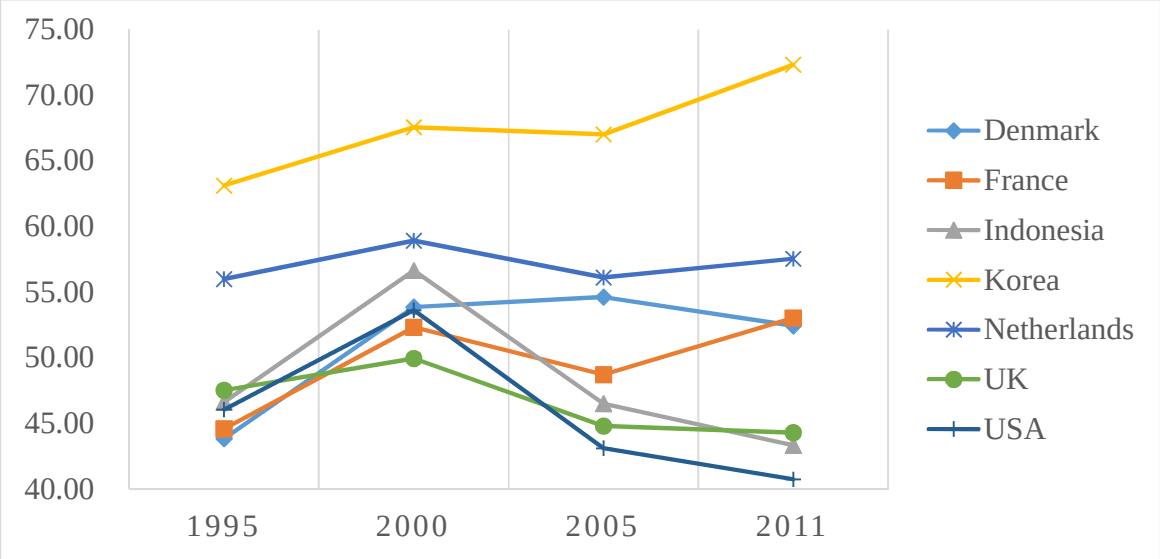

Figure 12. Share of total intermediate input in total input

Source: calculated by author using OECD's Input-Output Tables

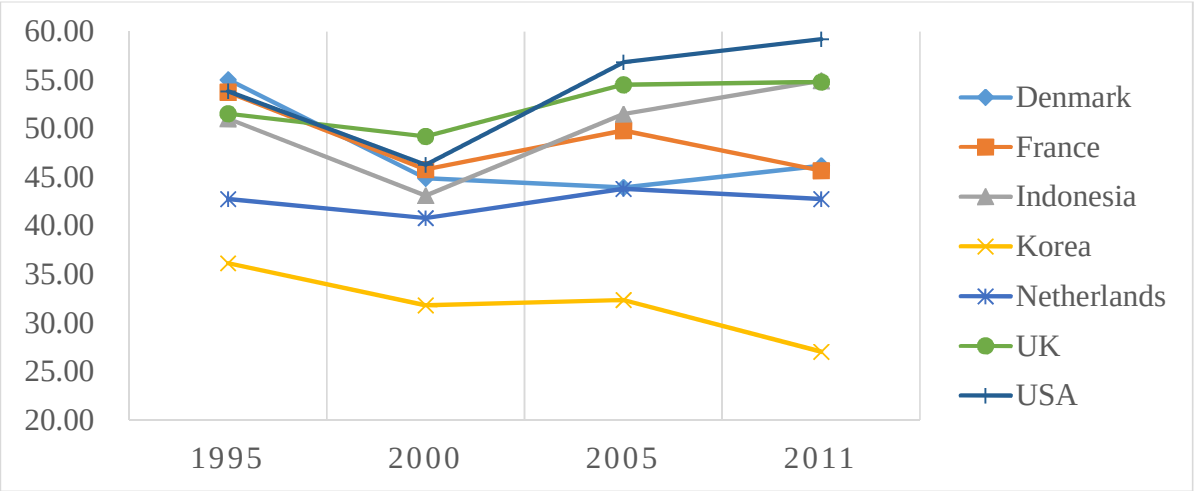

Figure 13. Share of total value-added in total input

Source: calculated by author using OECD's Input-Output Tables

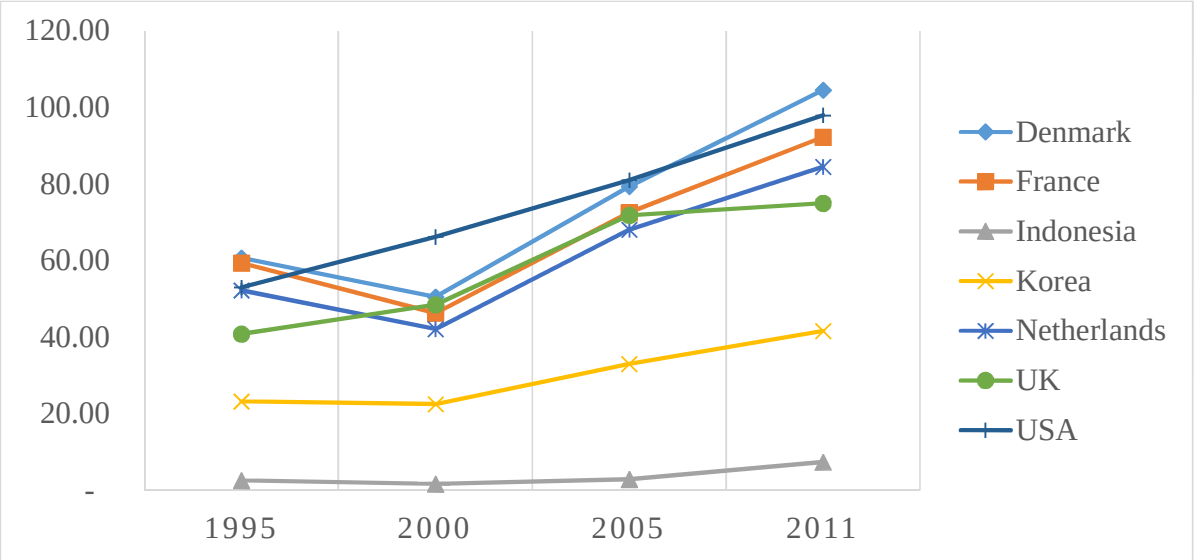

Figure 14. Labor productivity in all industry

Source: calculated by author using OECD's Input-Output Tables

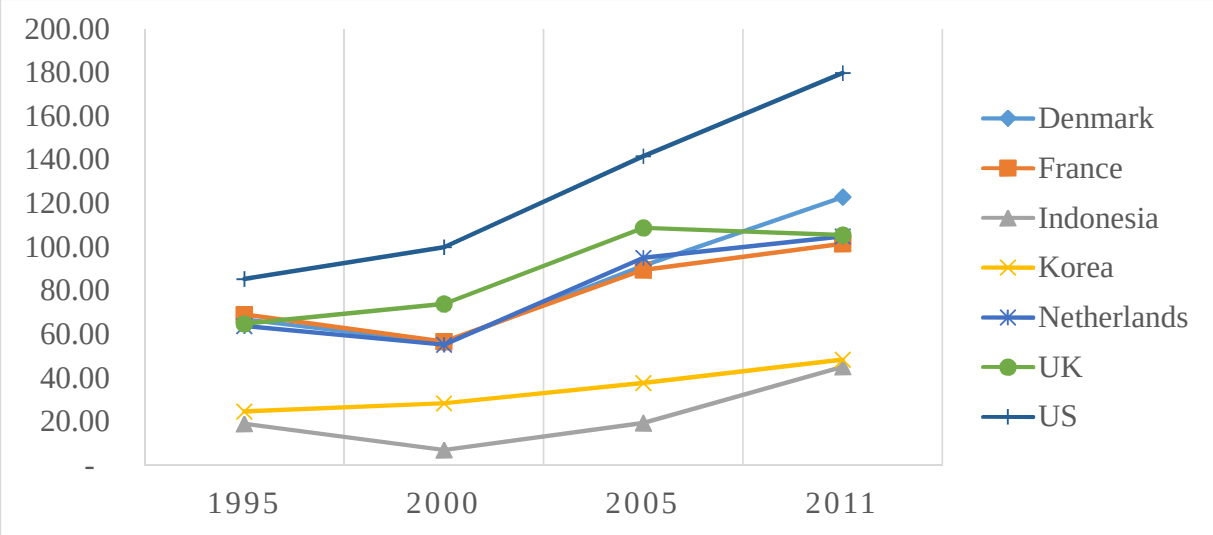

Figure 15. Labor productivity in the ICT industry

Source: calculated by author using OECD's Input-Output Tables

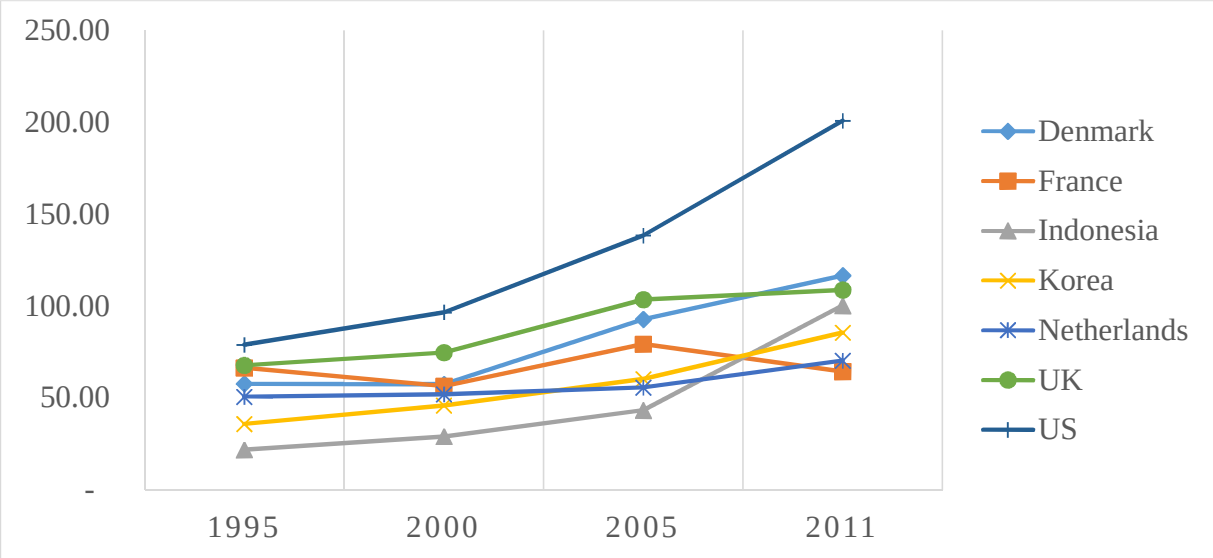

Figure 16. Labor productivity in industry of computer, electronic & optical equipment

Source: calculated by author using OECD's Input-Output Tables

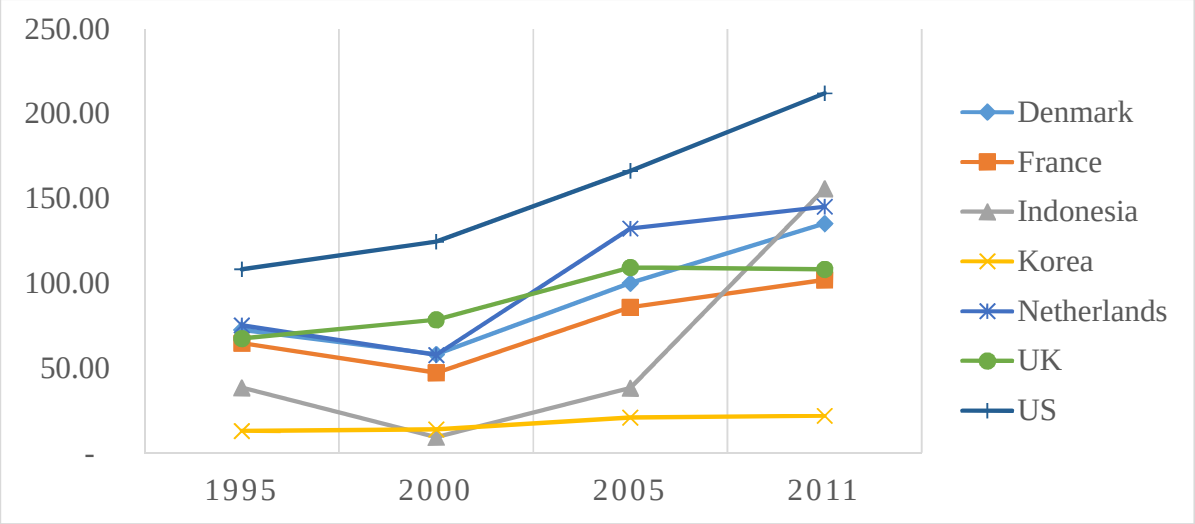

Figure 17. Labor productivity in industry of post and telecommunications

Source: calculated by author using OECD's Input-Output Tables

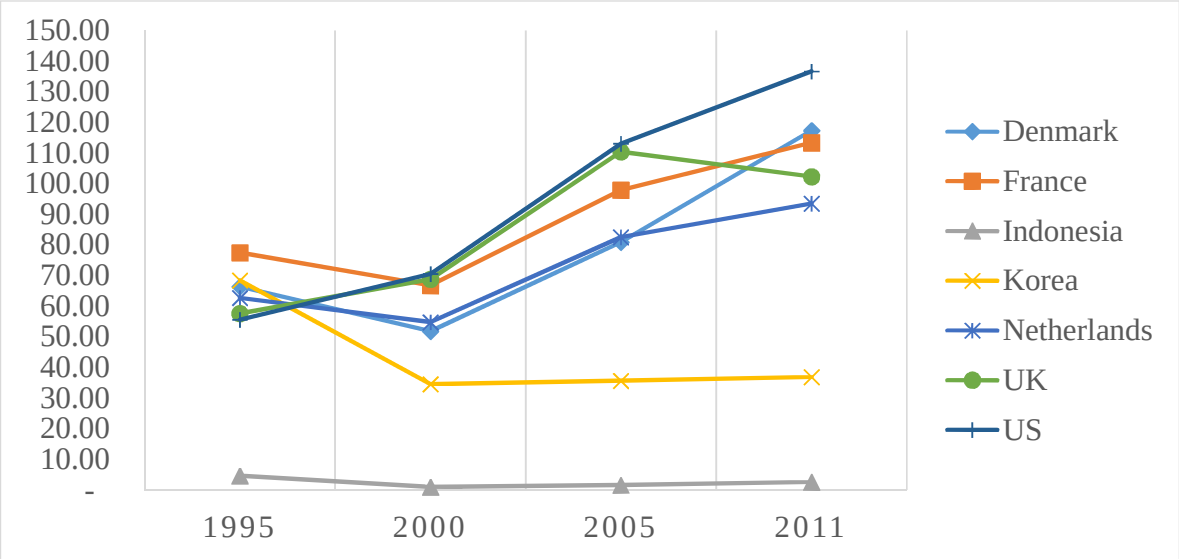

Figure 18. Labor productivity in industry of computer and related activities

Source: calculated by author using OECD's Input-Output Tables

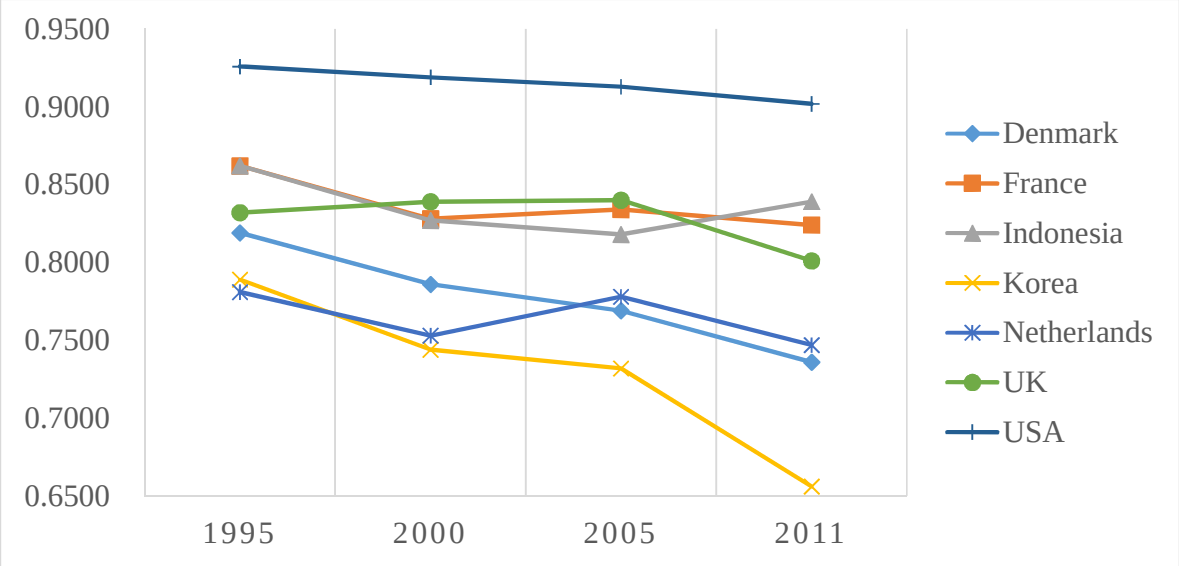

Figure 19. VAM of total final demand

Source: calculated by author using OECD's Input-Output Tables

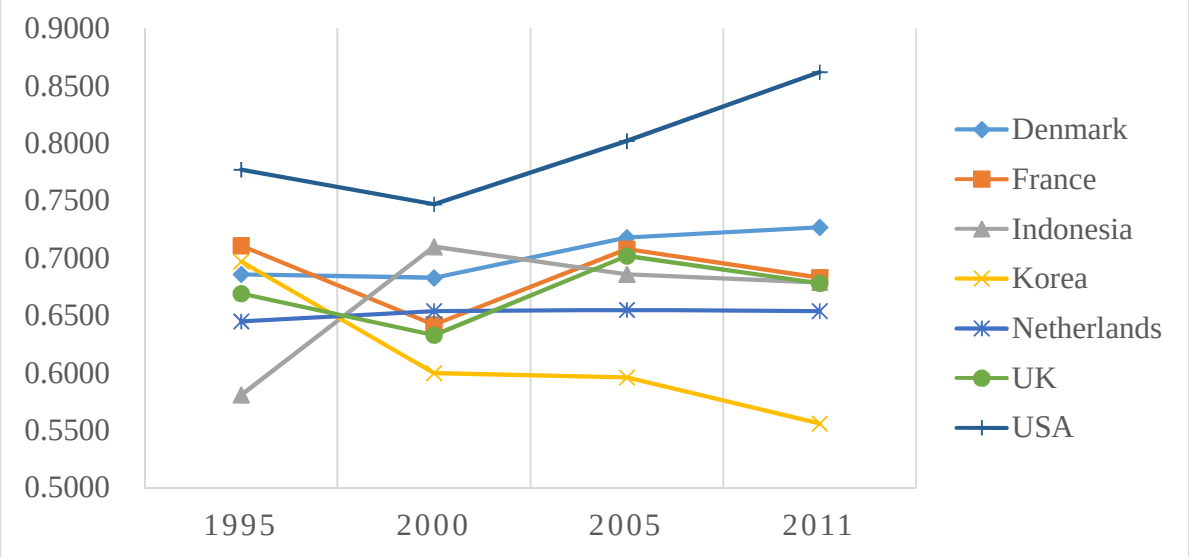

Figure 20. VAM of individual product - computer, electronic & optical equipment

Source: calculated by author using OECD's Input-Output Tables

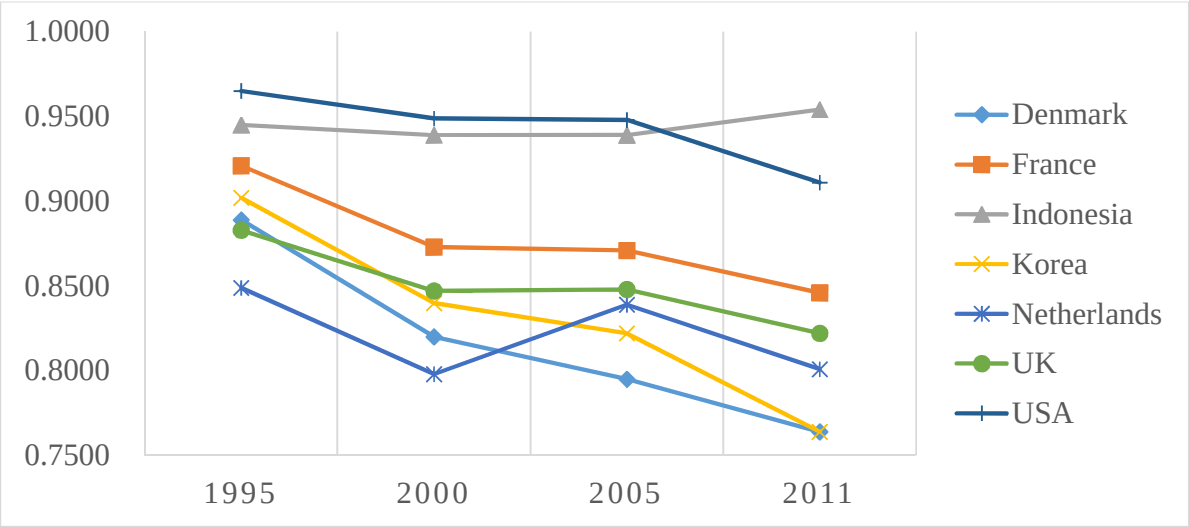

Figure 21. VAM of individual product - post and telecommunications

Source: calculated by author using OECD's Input-Output Tables

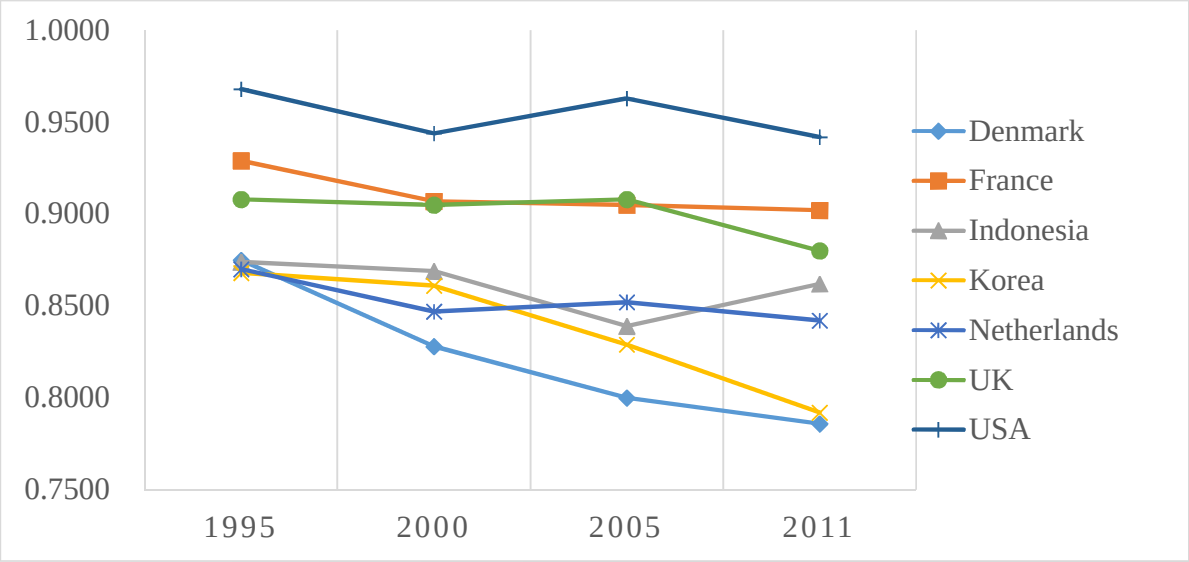

Figure 22. VAM of individual product - computer and related activities

Source: calculated by author using OECD's Input-Output Tables

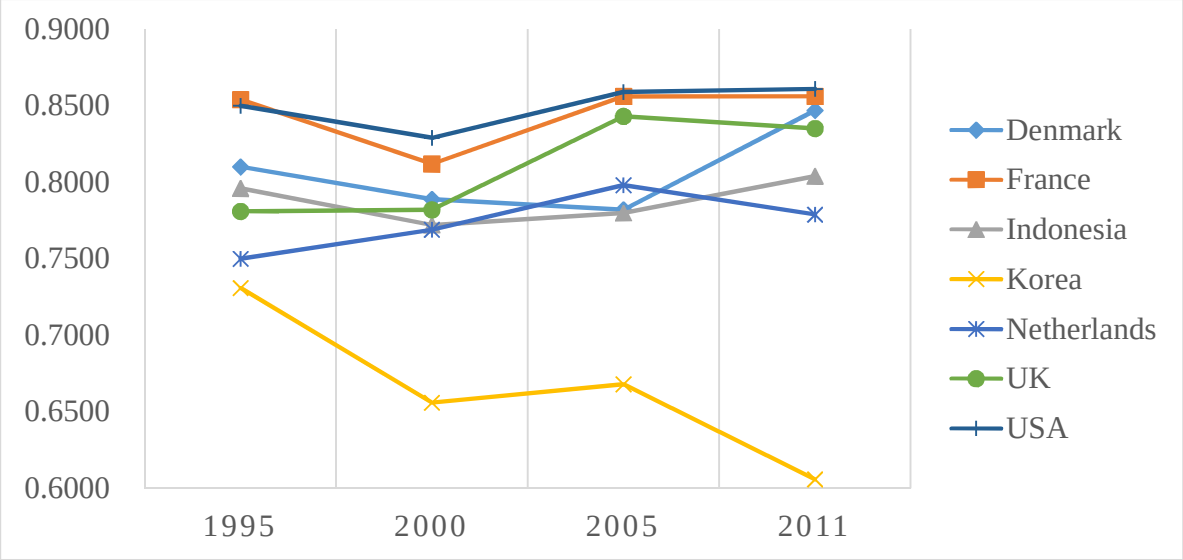

Figure 23. VAM of ICT products

Source: calculated by author using OECD's Input-Output Tables

APPENDIX B

Table 1.

ICT industry classification

Code in IOTs	Division	Class	Description
			Manufacturing:
C30T33X	30	3000	Office, accounting and computing machinery
	33	3210	Electronic valves and tubes and other electronic components
		3220	TV and radio transmitters and apparatus for line telephony and line telegraphy
		3230	Television and radio receivers, sound or video recording, etc.
		3312	Instruments and appliances for measuring, checking, testing, navigating & other purposes, except industrial process control equipment
	33	3313	Industrial process control equipment
			Services:
C64	64	6420	Telecommunications
C72	72	7210	Hardware consultancy
		7221	Software publishing
		7229	Other software consultancy and supply
		7230	Data processing
		7240	Database activities and online distribution of electronic content
		7250	Maintenance and repair of office, accounting and computing machinery
		7290	Other computer-related activities

Note: From ISIC Rev.3.1

Table 2.

ICT industry classification (excluded in this study)

Code in IOTs	Class	Description
C31	3110 – 3140, 3190	**Manufacture of Electrical machinery and apparatus n.e.c.** (3120 - insulated wire and cable is classified as ICT sector but excluded in this study)
C50T52	5010 -5050	**Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel**
	5110, 5121, 5122, 5131, 5139, 5141-5143, 5149, 5151, 5152, 5159, 5190	**Wholesale trade and commission trade, except of motor vehicles and motorcycles** (5151 - computers, computer peripheral equipment and software and 5152 - electronics and telecommunications parts and equipment are classified as ICT sector but excluded in this study)
	5211, 5219, 5220, 5231-5234, 5239, 5240, 5251, 5252, 5259, 5260	**Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods**
C71	7111-7113, 7121-7123, 7129, 7130	**Renting of machinery and equipment without operator and of personal and household goods** (7123 - Renting of office machinery and equipment (including computers) is classified as ICT sector but excluded in this study)

Note: From ISIC Rev.3.1

Table 3.

List of products classified in manufactured goods

No	Name of products
1	Food products, beverages and tobacco
2	Textiles, textile products, leather and footwear
3	Wood and products of wood and cork
4	Pulp, paper, paper products, printing and publishing
5	Coke, refined petroleum products and nuclear fuel
6	Chemicals and chemical products
7	Rubber and plastics products
8	Other non-metallic mineral products
9	Basic metals
10	Fabricated metal products
11	Machinery and equipment, nec
12	Computer, Electronic and optical equipment
13	Electrical machinery and apparatus, nec
14	Motor vehicles, trailers and semi-trailers
15	Other transport equipment
16	Manufacturing nec; recycling

Note: From ISIC Rev 3.1.

Table 4.

List of products classified in business service

No	Name of products
1	Wholesale and retail trade; repairs
2	Hotels and restaurants
3	Transport and storage
4	Post and telecommunications
5	Financial intermediation
6	Real estate activities
7	Renting of machinery and equipment
8	Computer and related activities
9	R&D and other business activities

Note: From Author's classification

Table 5.

Input structure - ICT products of total input on average of the ICT industry

No	Country Name	1995	2000	2005	2011
1	Korea	27.83	35.97	35.17	38.27
2	Denmark	11.95	16.42	18.04	25.92
3	France	16.14	20.11	16.47	18.31
4	Indonesia	7.18	10.15	11.38	15.60
5	US	21.11	23.81	17.20	15.08
6	Netherlands	9.41	14.58	15.04	13.63
7	UK	14.84	17.26	13.84	13.39

Note: calculated by author using OECD's Input-Output Tables

Table 6.

Input structure – manufactured goods of total input on average of the ICT industry

No	Country	1995	2000	2005	2011
1	Korea	40.99	42.74	43.66	51.18
2	Indonesia	20.80	27.83	22.53	21.54
3	France	19.80	20.91	13.33	11.71
4	UK	22.80	20.04	12.52	10.83
5	US	20.25	19.71	12.56	10.80
6	Netherlands	17.81	13.14	9.72	9.38
7	Denmark	13.27	13.44	9.71	5.97

Note: calculated by author using OECD's Input-Output Tables

Table 7.

Input structure – business service of total input on average of the ICT industry

No	Country Name	1995	2000	2005	2011
1	Denmark	25.44	33.20	37.46	43.50
2	Netherlands	32.22	40.21	41.09	43.18
3	France	22.38	28.93	32.50	36.61
4	UK	21.81	26.68	28.57	29.69
5	US	21.74	29.22	26.22	25.58
6	Korea	17.80	20.57	21.45	19.16
7	Indonesia	23.00	25.17	19.22	16.91

Note: calculated by author using OECD's Input-Output Tables

Table 8.

Input structure – Hi-tech service of total input on average of the ICT industry

No	Country Name	1995	2000	2005	2011
1	Netherlands	22.41	30.77	32.28	33.72
2	Denmark	12.84	19.54	25.49	31.41
3	France	13.51	19.55	23.78	28.41
4	UK	12.14	16.65	19.66	20.84
5	US	13.39	19.80	18.25	18.26
6	Korea	6.82	11.01	12.68	10.94
7	Indonesia	9.98	9.53	8.84	8.70

Note: calculated by author using OECD's Input-Output Tables

Table 9.

Input structure – ICT service of total input on average of the ICT industry

No	Country Name	1995	2000	2005	2011
1	Denmark	5.21	10.35	14.50	22.73
2	France	5.18	8.89	11.35	14.74
3	Netherlands	4.69	10.68	12.69	11.12
4	US	7.14	10.61	9.95	9.20
5	UK	3.79	5.68	7.92	8.45
6	Indonesia	3.70	2.31	3.76	4.84
7	Korea	1.74	5.26	5.08	3.98

Note: calculated by author using OECD's Input-Output Tables

Table 10.

Exports composition in ICT products

No	Country Name	1995	2000	2005	2011
1	Netherlands	17.55	30.43	29.39	23.53
2	Korea	22.58	28.38	27.02	21.21
3	US	18.64	19.56	14.48	11.30
4	UK	17.13	20.67	17.79	8.75
5	Denmark	7.31	10.76	10.60	7.23
6	France	8.08	11.30	8.19	6.25
7	Indonesia	4.51	8.09	7.35	4.30

Note: calculated by author using OECD's Input-Output Tables

Table 11.

Shares of ICT product in total import

No	Country Name	1995	2000	2005	2011
1	Netherlands	17.63	31.17	31.70	25.40
2	US	17.46	17.88	14.61	15.28
3	UK	15.46	20.86	17.49	10.59
4	Korea	12.07	19.80	14.72	10.58
5	Denmark	13.28	12.75	13.12	10.06
6	Indonesia	4.49	3.93	4.17	7.54
7	France	9.24	12.04	9.45	7.44

Note: calculated by author using OECD's Input-Output Tables

Table 12.

Share of ICT industry in terms of GDP (value-added)

No	Country Name	1995	2000	2005	2011
1	Korea	6.89	9.67	9.55	8.83
2	UK	6.16	7.44	6.66	6.36
3	US	6.39	6.50	6.18	6.28
4	Denmark	4.09	4.88	4.94	5.10
5	France	5.16	5.80	5.46	4.76
6	Netherlands	4.03	5.42	5.32	4.76
7	Indonesia	1.34	2.94	4.18	4.72

Note: calculated by author using OECD's Input-Output Tables

Table 13.

Share of ICT industry in terms of gross output

No	Country Name	1995	2000	2005	2011
1	Korea	8.17	12.43	11.65	11.12
2	US	6.43	7.52	5.87	5.78
3	UK	5.84	7.37	6.17	5.72
4	Denmark	3.91	5.54	5.52	5.25
5	France	4.98	6.26	5.45	5.11
6	Netherlands	4.54	6.17	5.76	5.05
7	Indonesia	1.35	3.34	4.09	4.36

Note: calculated by author using OECD's Input-Output Tables

Table 14.

Share of imported intermediate inputs in domestic intermediate inputs

No	Country Name	1995	2000	2005	2011
1	Netherlands	78.37	97.54	94.93	111.44
2	Denmark	57.47	69.14	71.05	75.90
3	UK	37.17	38.24	41.86	48.33
4	Korea	30.55	36.51	35.19	42.28
5	France	31.27	38.12	37.09	40.32
6	Indonesia	31.75	37.89	40.81	33.20
7	US	17.46	20.53	22.95	26.45

Note: calculated by author using OECD's Input-Output Tables

Table 15.

Share of total intermediate input in total input

No	Country Name	1995	2000	2005	2011
1	Korea	63.14	67.56	67.02	72.35
2	Netherlands	56.00	58.94	56.13	57.56
3	France	44.59	52.34	48.71	53.05
4	Denmark	43.85	53.86	54.62	52.45
5	UK	47.54	49.96	44.81	44.31
6	Indonesia	46.64	56.64	46.52	43.33
7	US	46.06	53.63	43.12	40.75

Note: calculated by author using OECD's Input-Output Tables

Table 16.

Share of total value-added in total input

No	Country Name	1995	2000	2005	2011
1	US	53.89	46.32	56.85	59.24
2	Indonesia	51.04	43.13	51.53	54.95
3	UK	51.58	49.24	54.55	54.83
4	Denmark	55.06	44.93	43.98	46.20
5	France	53.77	45.82	49.84	45.71
6	Netherlands	42.78	40.82	43.83	42.78
7	Korea	36.17	31.85	32.38	27.05

Note: calculated by author using OECD's Input-Output Tables

Table 17.

Employment in all industry (person, thousands)

No	Country Name	1995	2000	2005	2011
1	Denmark	2,588.00	2,712.10	2,742.00	2,737.50
2	US	127,379.50	139,068.90	143,905.60	142,044.70
3	France	23,653.20	25,630.10	26,344.70	27,008.10
4	Netherlands	7,251.30	8,177.50	8,321.40	8,806.30
5	UK	25,774.70	27,415.70	28,810.80	29,288.40
6	Korea	20,385.00	21,095.00	22,825.00	24,195.70
7	Indonesia	84,006.80	92,746.90	95,201.50	110,583.30

Note: calculated by author using OECD's Input-Output Tables

Table 18.

Labor productivity in all industry

No	Country Name	1995	2000	2005	2011
1	Denmark	60.70	50.56	79.46	104.56
2	US	53.06	66.26	81.07	97.95
3	France	59.38	46.27	72.60	92.28
4	Netherlands	52.23	42.13	68.13	84.57
5	UK	40.81	48.46	71.86	75.07
6	Korea	23.28	22.50	33.02	41.64
7	Indonesia	2.63	1.73	2.90	7.37

Note: calculated by author using OECD's Input-Output Tables

Table 19.

Employment in ICT industry (person, thousands)

No	Country Name	1995	2000	2005	2011
1	US	5,057.60	5,992.60	5,093.40	4,853.40
2	Denmark	96.10	119.50	117.40	118.60
3	UK	997.80	1,335.40	1,265.20	1,324.20
4	Netherlands	238.90	337.50	317.00	337.50
5	France	1,047.60	1,213.50	1,167.10	1,167.60
6	Korea	1,317.00	1,611.90	1,908.30	1,839.10
7	Indonesia	155.70	676.10	594.90	852.20

Note: calculated by author using OECD's Input-Output Tables

Table 20.

Labor Productivity in the ICT industry

No	Country Name	1995	2000	2005	2011
1	US	85.43	99.98	141.66	179.91
2	Denmark	66.83	55.96	91.63	122.99
3	UK	64.92	73.97	108.91	105.54
4	Netherlands	63.94	55.35	95.19	105.01
5	France	69.14	56.69	89.53	101.62
6	Korea	24.81	28.48	37.71	48.39
7	Indonesia	19.07	6.97	19.41	45.16

Note: calculated by author using OECD's Input-Output Tables

Table 21.

VAM of total final demand

No	Country	1995	2000	2005	2011
1	Denmark	0.8190	0.7860	0.7690	0.7360
2	France	0.8620	0.8280	0.8340	0.8240
3	Indonesia	0.8620	0.8270	0.8180	0.8390
4	Korea	0.7890	0.7440	0.7320	0.6560
5	Netherlands	0.7810	0.7530	0.7780	0.7470
6	UK	0.8320	0.8390	0.8400	0.8010
7	USA	0.9260	0.9190	0.9130	0.9020

Note: calculated by author using OECD's Input-Output Tables

Table 22.

VAM of the final demand for product of computer, electronic & optical equipment

No	Country	1995	2000	2005	2011
1	Denmark	0.6860	0.6830	0.7180	0.7270
2	France	0.7110	0.6420	0.7080	0.6830
3	Indonesia	0.5810	0.7100	0.6860	0.6790
4	Korea	0.6970	0.6000	0.5960	0.5560
5	Netherlands	0.6450	0.6540	0.6550	0.6540
6	UK	0.6690	0.6330	0.7020	0.6780
7	USA	0.7770	0.7470	0.8020	0.8620

Note: calculated by author using OECD's Input-Output Tables

Table 23.

VAM of the final demand for product of post and telecommunications

No	Country	1995	2000	2005	2011
1	Denmark	0.8890	0.8200	0.7950	0.7640
2	France	0.9210	0.8730	0.8710	0.8460
3	Indonesia	0.9450	0.9390	0.9390	0.9540
4	Korea	0.9020	0.8400	0.8220	0.7640
5	Netherlands	0.8490	0.7980	0.8390	0.8010
6	UK	0.8830	0.8470	0.8480	0.8220
7	USA	0.9650	0.9490	0.9480	0.9110

Note: calculated by author using OECD's Input-Output Tables

Table 24.

VAM of the final demand for product of computer and related activities

No	Country	1995	2000	2005	2011
1	Denmark	0.8750	0.8280	0.8000	0.7860
2	France	0.9290	0.9070	0.9050	0.9020
3	Indonesia	0.8740	0.8690	0.8390	0.8620
4	Korea	0.8680	0.8610	0.8290	0.7920
5	Netherlands	0.8700	0.8470	0.8520	0.8420
6	UK	0.9080	0.9050	0.9080	0.8800
7	USA	0.9680	0.9440	0.9630	0.9420

Note: calculated by author using OECD's Input-Output Tables

Table 25.

VAM of the final demand for ICT products

No	Country	1995	2000	2005	2011
1	Denmark	0.8100	0.7890	0.7820	0.8470
2	France	0.8540	0.8120	0.8560	0.8560
3	Indonesia	0.7960	0.7720	0.7800	0.8040
4	Korea	0.7310	0.6560	0.6680	0.6060
5	Netherlands	0.7500	0.7690	0.7980	0.7790
6	UK	0.7810	0.7820	0.8430	0.8350
7	USA	0.8500	0.8290	0.8590	0.8610

Note: calculated by author using OECD's Input-Output Tables

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